1.0 PURPOSE

To document procedures and work practices used to meet continuous emissions monitoring system (CEMS) quality control program requirements of 40 CFR Part 63 (RMACT II). Additional requirements regarding 40 CFR Part 60 (NSPS), 40 CFR Part 98 (GHG), the 2017 Consent Decree, 40 CFR Part 75 (CEMS) and 40 CFR Part 70 (Title V) permit specific requirements are included in the document to better define all CEMS regulatory obligations at the Lemont Refinery.

2.0 SCOPE

2.1 Applies To: Operations, Maintenance and Environmental departments of the CITGO Lemont Refinery for continuous emission monitoring systems.

2.2 Exceptions: Does not apply to other Continuous Parameter Monitoring Systems (CPMS) such as flare NHV monitors or Method 21 LDAR monitors.

3.0 GENERAL

At all times, including periods of startup, shutdown, and malfunction, CITGO must operate and maintain any affected source, including associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions. The general duty to minimize emissions during a period of startup, shutdown, or malfunction does not require the owner or operator to achieve emission levels lower than that required by the applicable standard.

NOTE: The CEMS must be operated and data recorded during all periods of operation except during periods of monitor downtime (out of control or maintenance). Data must be recorded during calibration checks, zero and span adjustments. The CEMS must be in service prior to startup of a process unit.

The principle of the quality assurance procedures consists of two distinct and equally important functions. One function is the assessment of the quality of the CEMS data by estimating accuracy. The other function is the control and improvement of the quality of the CEMS data by implementing quality control policies and corrective actions. These two functions form a control loop: when the assessment function indicates that the data quality is inadequate, the control effort must be increased until the data quality is acceptable.

No less than one time per 12-month period this plan will be reviewed and updated as needed by the appropriate personnel in the Environmental and Maintenance Departments. In addition, the

plan will be updated if a root cause analysis and correct action plan should result in the need for updates.

4.0 AFFECTED SOURCES

4.1 Fluidized Catalytic Cracking Units (FCCU)

The process vents on fluidized catalytic cracking units that are associated with regeneration of the catalyst used in the unit (i.e., the catalyst regeneration flue gas vent).

4.2 Sulfur Recovery Units (SRU)

The process vents on the tail gas treatment units serving sulfur recovery plants

4.3 Fuel Gas Combustion Devices

Any equipment, such as process heaters and boilers, used to combust fuel gas, except facilities in which gases are combusted to produce sulfur or sulfuric acid.

4.4 Steam Generating Units (Boilers)

Devices that combust any fuel or byproduct/waste to produce steam or to heat water or any other heat transfer medium.

4.5 Flares

Lemont Refinery has only elevated flares; they support combustion at a tip that is situated at the upper end of the vertical conveyance. Lemont Refinery flares include the following: C1Flare, C2 Flare, C3 Flare C4 Flare (aka Coker Flare), C5 Flare (aka Alky Flare)

5.0 DEFINITIONS

40CFR Part 75 Continuous Emissions Monitoring - The purpose of this part is to establish requirements for the monitoring, recordkeeping, and reporting of sulfur dioxide (SO_2), nitrogen oxides (NO_X), and carbon dioxide (CO_2) emissions, volumetric flow, and opacity data from affected units under the Acid Rain Program

Alternate Monitoring Plan (AMP) – means a plan developed by the owner/operator that has been accepted by the regulatory agency as a substitute for a continuous monitoring system for an affected source.

Calibration – Adjustments are made on the analyzer until the difference between the current readings and the known calibration gas values are within acceptable tolerances.

Calibration Drift – The difference in the CEMS output reading from a reference value after a period of operation during which no unscheduled maintenance, repair or adjustment took place. The reference value may be supplied by a cylinder gas, gas cell, or optical filter and need not be certified.

CEMS Downtime – Those periods of time when the CEMS is not operational or is off line such as during a CEMS shutdown, maintenance or repair. CEMS downtime does not occur during times when the process is shutdown.

Consent Decree (2017 CD) – the Consent Decree, United States of America v. CITGO Petroleum Corporation and PDV Midwest Refining, LLC, 16C 10484, entered by US District Court of the Northern District of Illinois on January 11, 2017

Continuous emission monitoring system (CEMS) - means the total equipment that may be required to meet the data acquisition requirements, used to sample, condition (if applicable), analyze, and provide a record of emissions.

Continuous monitoring system (CMS) is a comprehensive term that may include, but is not limited to, continuous emission monitoring systems, continuous opacity monitoring systems, continuous parameter monitoring systems, or other manual or automatic monitoring that is used for demonstrating compliance with an applicable regulation on a continuous basis as defined by the General Provisions of RMACT II.

Continuous opacity monitoring system (COMS) - means a continuous monitoring system that measures the opacity of emissions. Currently, the Lemont Refinery does not have any COMS at the facility.

Continuous parameter monitoring system (CPMS) – means the total equipment that may be required to meet the data acquisition and availability requirements, used to sample, condition (if applicable), analyze, and provide a record of process or control system parameters.

Control device – any equipment used for recovering, removing or oxidizing air pollutants in either gaseous or solid form. Such equipment includes, but is not limited to, condensers, scrubbers, electrostatic precipitators, incinerators, flares, boilers and process heaters.

Cylinder Gas Audit (CGA) – If applicable, a CGA may be conducted in three of four calendar quarters, but in no more than three quarters in succession. To conduct a CGA,

first challenge the CEMS (both pollutant and diluent portions of the CEMS, if applicable) with an audit gas of known concentration at two specified points within certain ranges.

DAHS – refers to a data acquisition and handling system, used to collect, manage and report CEMS data.

EOL – Environmental Operating Limit

EPA - United States Environmental Protection Agency

FGR – Flare Gas Recovery.

Fuel gas – any gas which is generated at a petroleum refinery and is combusted. Fuel gas also includes natural gas when the natural gas is combined and combusted in any proportion with a gas generated at the refinery. Fuel gas does not include gases generated by catalytic cracking unit catalyst regenerators and fluid coking burners.

IEPA – Illinois Environmental Protection Agency

LDAR – Leak detection and repair.

Malfunction - means any sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions

NOx SIP-Call – A phrase used to reference 35 IAC 217, Subpart U. This rule required the 430B-1 Aux Boiler to participate in EPA's NOx Budget Trading Program. That program required monitoring pursuant to 40 CFR Part 75, and submitting electronic reports to U.S. EPA. The site-specific trading aspects of the NOx Budget Trading Program have become irrelevant, however the monitoring and reporting aspects of the rule continue.

NSPS Subpart Db – a term used to describe 40 CFR 60 Subpart Db New Source Performance Standards for Industrial-Commercial-Institutional Steam Generating Units that have a heat input capacity from fuels combusted in the steam generating unit of greater than 100 MMBtu/hr.

NSPS Subpart J – a term used to describe 40 CFR 60 Subpart J New Source Performance Standards for Petroleum Refineries: fluid catalytic cracking unit catalyst

regenerators, fuel gas combustion devices, and all Claus sulfur recovery plants except Claus plants of 20 long tons per day or less.

NSPS Subpart Ja - a term used to describe 40 CFR 60 Subpart Ja New Source Performance Standards for Petroleum Refineries: fluid catalytic cracking units, fluid coking units, delayed coking units, fuel gas combustion devices, including flares and process heaters and sulfur recovery plants. For flares, this rule applies to flares commencing construction, reconstruction or modification after June 24, 2008. For all other sources listed, the rule applies when commencing construction, reconstruction or modification after May 14, 2007.

NSR – New Source Review

Operators - Operations personnel responsible for implementing operating procedures within the process units or areas.

Out of Control – is determined when the daily calibration drift measurements indicate significant loss of instrument precision.

Parametric emission monitoring system (PEMS) – A monitoring system using operational parameters as input to a model developed during a period when stacks were temporarily monitored with a GC. The model covers a range of operating scenarios and must have a RATA annually and RAA quarterly. Quarterly RAA switches to Semi-Annual after 1 year of passing RAA/RATA.

Period of Operation - Those periods in which the process is in operation, including startup, shutdown and malfunction.

Process Historian (PI) – a software program that collects and stores, in a time series database, a continuous record of process and equipment conditions for various information and control system platforms as they occur. This data is accessible to clients through user-configurable reporting, analysis and Web based software tools running on enterprise servers for display of current and past production data.

Preventive Maintenance (PM) – Program/processes of inspection and regular care that allows potential problems to be detected and solved early or prevented altogether by providing a systematic inspection, detection, and prevention of incipient failures. The checks may include visual, mechanical, electrical, and electronic actions that are made to determine whether or not equipment is functioning properly, thereby resulting in steps to retain an item in the specified condition.

Reference Method (RM) – means any method of sampling and analyzing for an air pollutant as specified in the applicable regulation.

Relative Accuracy Test Audit (RATA) – A series of nine 21-minute test runs where an analyzer is challenged against a reference method analyzer.

RMACT II – a term used to describe 40 CFR 63 Subpart UUU National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units and Sulfur Recovery Units.

SAP – "Systems, Applications & Products in Data Processing"; a data system used by CITGO.

SME – Subject Matter Expert

Shutdown - The cessation of affected sources within a petroleum refining process unit for purposes including, but not limited to, periodic maintenance, replacement of equipment, or repair.

SOP (Standard Operating Procedure) – a term applied to a procedure developed for operation of an affected source.

Startup - The setting into operation of an affected source within a petroleum refining process unit for purposes of production. Startup does not include operation solely for purposes of testing equipment. Startup does not include changes in product for flexible operation units.

Unit Supervisors - Operations personnel responsible for managing daily operations of units.

Valid Data – Sufficient data received from CEMS that has passed all quality control requirements including initial certifications, calibrations, cylinder gas audits and relative accuracy test audits (RATA).

VCEMS – Data Acquisition System in use at Lemont Refinery. Also referred to as "Vivicom".

6.0 RESPONSIBILITIES

6.1 Sponsor: Manager, Environmental Department

6.2 Implementation:

6.2.1Initiation: Environmental Department, Analyzer Group and Operations Departments.

6.2.2 Performance: Analyzer and Environmental departments are responsible for the implementation of procedures.

6.2.3 Audit: Environmental & Analyzer Departments

7.0 FACILITY-SPECIFIC CEMS COMPLIANCE POINTS

Refer to Attachment 5 for a complete list of compliance points, including source, pollutant and rules driving the requirements.

Should any compliance changes result in the removal of a CEMS that is listed as “Existing CEMS” in the 2017 CD, a notice must be submitted to the EPA which includes the following information within 60 days of the date the operation of the analyzer was no longer required:

- Identify the legal requirements that formerly required the CEMS operation
- The date the legal requirement no longer was applicable

8.0 PROCEDURE

8.1 Overview

8.1.1 RMACT II Monitoring Provisions

The General Provisions of 40 CFR 63 Subpart A §63.8 monitoring provisions, as found in Table 44 of the Refinery MACT II rule, requires any CEMS installed for the purpose of compliance with the rule to meet certain general provisions.

EPA regulations require that facilities develop and implement quality control programs for continuous monitoring systems used to comply with a relevant standard. Specifically, each quality control program shall include, at a minimum, a written protocol that describes procedures for each of the following practices:

- Initial and any subsequent calibration of the CEMS;

- Determination and adjustment of the calibration drift of the CEMS;
- Preventive maintenance of the CEMS, including spare parts inventory;
- Data recording, calculations, and reporting;
- Accuracy audit procedures, including sampling and analysis methods; and
- Program of corrective action for a malfunctioning CEMS.

The owner or operator shall keep these written procedures on record for the life of the affected source or until the affected source is no longer subject to the RMACT II provisions.

The owner or operator of an affected facility shall maintain and operate each CEMS in a manner consistent with good air pollution control practices.

The owner or operator must keep the necessary spare parts for routine repair of the affected CEMS equipment readily available.

The owner or operator of an affected source must develop and implement a written startup, shutdown and malfunction plan for the CEMS.

The CEMS must be installed in a location that provides representative measurements of the pollutant being measured in the vent.

The read out (that portion of the CEMS that provides a visual display or record) must be readily accessible on site for operational control or inspection by the operator of the equipment.

All CEMS shall be installed and operational either prior to or in conjunction with conducting performance tests. Verification of operational status shall, at a minimum, include completion of the manufacturer's written specifications or recommendations for installation, operation, and calibration of the system.

Except for system breakdowns, Out Of Control periods, repairs, maintenance periods, calibration checks, and zero (low-level) and high-level calibration drift adjustments and source outages, all CEMS shall be in continuous operation and shall meet minimum frequency of operation requirements as shown in Attachment 4.

The owner or operator of a CEMS must check the zero (low-level) and high-level calibration drift (CD) at least once daily. The zero (low-level) and high-level calibration drift must be adjusted, at a minimum, whenever the 24-hour zero (low-

level) drift exceeds two times the limits of the applicable performance specification listed in 40 CFR 60 Appendix B.

The system shall allow the amount of excess zero (low-level) and high-level drift measured at the 24-hour interval checks to be recorded and quantified.

Out-of-Control – The out-of-control criteria found in 40 CFR 60 Appendix F takes precedence over the out-of-control period found in 40 CFR 63 Subpart A. The out-of-control criteria used in this plan reflects Part 60 Appendix F criteria. See Attachment 1 for the basis of this determination. Out-of-Control periods are defined below.

The beginning of the out-of-control period is;

- The time corresponding to the completion of the fifth, consecutive, daily CD check with a CD in excess of two times the allowable limit, or
- The time corresponding to the completion of the daily CD check preceding the daily CD check that results in a CD in excess of four times the allowable limit, or
- The time corresponding to the completion of the sampling for the RATA CGA which indicates excessive audit inaccuracy.

The end of the out-of-control period is;

- The time corresponding to the completion of the CD check following corrective action that results in the CD's at both the zero (or low-level) and high-level measurement points being within the corresponding allowable CD limit (i.e., either two times or four times the allowable limit in appendix B), or
- The time corresponding to the completion of the sampling of the subsequent successful audit.

When a CEMS is found to be Out Of Control (See 40 CFR 60 Appendix F Out Of Control criteria), environmental regulations require that the following actions be taken;

- Take corrective action and conduct retesting (CD, CGA, or RATA) until the performance requirements are below the applicable limits.
- Record the beginning and end of the Out Of Control period.

- During the period the CEMS is Out Of Control, recorded data shall not be used in data averages and calculations, or to meet any data availability requirement.

8.1.2 NSPS Monitoring Provisions

The General Provisions of NSPS at 40 CFR 60.13 require any CEMS installed for the purpose of compliance with the rule to meet certain general provisions.

The owner or operator of an affected facility shall maintain and operate each CEMS in a manner consistent with good air pollution control practices.

The CEMS must be installed in a location that provides representative measurements of the pollutant being measured in the vent.

The read out (that portion of the CEMS that provides a visual display or record) must be readily accessible on site for operational control or inspection by the operator of the equipment.

All CEMS shall be installed and operational either prior to or in conjunction with conducting performance tests. Verification of operational status shall, at a minimum, include completion of the manufacturer's written specifications or recommendations for installation, operation, and calibration of the system.

Except for system breakdowns, Out Of Control periods, repairs, maintenance periods, calibration checks, and zero (low-level) and high-level calibration drift adjustments and source outages, all CEMS shall be in continuous operation and shall meet minimum frequency of operation requirements as follows:

- All CEMS shall complete a minimum of one cycle of operation (sampling, analyzing and data recording) for each successive 15-minute period.

- See Attachment 4 for details on determining what constitutes a valid hour for purposes of NSPS requirements.

- Only valid CEMS data (or performance testing data) shall be used in emission averaging calculations for excess emissions reporting. The upper limit of the CEMS span shall be used in calculating hourly averages when the instrument is "over range". The only exception would be potential use of performance testing data during such periods when the instrument is not available.

- The owner or operator of a CEMS must check the zero (low-level) and high-level calibration drifts at least once daily. The zero (low-level) and high-level calibration drifts must be adjusted, at a minimum, whenever the 24-hour zero (low-level) or the 24-hour span (high-level) drift exceeds two times the limits of the applicable performance specification listed in 40 CFR 60 Appendix B. The system shall allow the amount of excess zero (low-level) and high-level drift measured at the 24-hour interval checks to be recorded and quantified.

Out Of Control – The Out Of Control criteria used in this plan reflects 40 CFR 60 Appendix F criteria. See section 8.1.1 above for defining Out of Control periods.

When a CEMS is found to be Out Of Control environmental regulations require that the following actions be taken:

- Take corrective action and conduct retesting (CD, CGA, or RATA) until the performance requirements are below the applicable limits.
- Record the beginning and end of the Out Of Control period.
- Record the end of the out-of-control period which is the hour following the completion of corrective action and successful demonstration that the system is within the allowable limits.
- During the period the CEMS is Out Of Control, recorded data shall not be used in data averages and calculations, or to meet any data availability requirement.

8.1.3 Training

Prior to performing work on any CEMS system an analyzer technician, CITGO employees and contractors, will complete necessary training. Training requirements for analyzer techs will be maintained, documented and retained by the Analyzer Group.

At least once every 12-month period, employees and contractors involved in CEMS operation and maintenance will receive training in order to maintain necessary levels of competence in maintaining and operating CEMS.

8.2 Calibration and Drift Adjustment

Calibrations to CEMS analyzers will be conducted by the Analyzer Group in accordance with the following maintenance procedures

- MNT-001 Calibration of Continuous Gas Analyzers
- MNT-002 Calibration of Gas Chromatograph (GC)

40 CFR 60.13, 63.8, 60.105, 40 CFR 75 and 40 CFR 63 Table 40 are used to establish the zero (low-level) and high level calibration ranges and daily calibrations will be conducted in accordance with the appropriate standard. Using these references, the corresponding calibration ranges are listed in Attachment 1.

The analyzer will automatically check the zero (low-level) and high-level calibration drifts at least once daily. The zero (low-level) and high-level calibration drifts will be adjusted, at a minimum, whenever the drift exceeds the limits listed in Attachment 1 according to the appropriate calibration procedure, as listed in the reference section of the procedure.

This document serves to satisfy the written procedure requirements of 40 CFR 60.13(d)(1). Cylinder gases used for daily drift measurement do not have to be certified, except in the case of Aux Boiler which is under the requirements of 40 CFR 75, which require the daily zero/span to be certified gases. However, it is a best practice to use gases which have been certified by comparison to National Bureau of Standards (NBS) gaseous Standard Reference Materials (SRM's) or NBS/EPA approved gas manufacturer's Certified Reference Materials (CRMs) following EPA Traceability Protocol No.1. Regardless of protocol used, daily calibration bottles must not be used beyond their expiration date

8.3 Preventive Maintenance and Spare Parts Inventory

Preventive maintenance actions can be found in procedure MNT-003 Preventive Maintenance of Process Analyzers. Included in MNT-003 are the following

- QA/QC activities for analyzers
- Procedures for routine and non-routine maintenance
- Documentation of spare parts required
- Review schedule

8.4 Data Recording, Calculations and Reporting

The monitoring of affected sources creates data and records that must be managed and reported. Various sources have reporting pursuant to various regulations. Please see Environmental Operating Limits (EOLs) for a summary of compliance points along with the reporting basis.

8.4.1 General Procedures

Data collection will be performed by electronic means as much as possible. Since the data management requirements are so extensive, automated methods of data collection, validation and reduction are essentially required. The following items are specific actions to be taken for data in general:

- Data collection – Per §63.10(b)(2)(vii) all raw data and at least 15 minute averages of sub-hourly CEMS data relating to compliance with a relevant emissions standard or operational standard shall be collected and kept.

- Reduction of monitoring data – Data shall be reduced to 1-hour averages computed from four or more data points equally spaced over each 1-hour period, except during periods when calibration, quality assurance, or maintenance activities pursuant to the provisions of the regulatory requirements are being performed. See Attachment 4 for details.

- Hourly averages – All hourly averages shall be based on “block” hourly periods (i.e., those should start and stop on the hour). Time periods for averaging purposes are defined in 40 CFR 63.2. (§63.2 “*one hour period*... means any 60-minute period commencing on the hour.”)

- Initial data validation – all data should be given an initial data validation after collection to avoid inclusion of data that is invalid for one or more reasons. Data that is determined to be invalid must not be used for averages, but must be kept in the monitoring record to the extent practicable. Reasons to invalidate data include the following:

    - Missing – data may be missing due to CEMS failure or data acquisition system failure. Missing data should not be substituted with other data, although credible evidence from other sources can be used to prove or disprove deviations for Title V deviation reporting

purposes. Missing data should also not be substituted with a zero. A zero is a real datum and should be used when the CEMS reads zero or within acceptable data validation limits near zero.

- Out of range – data may be out of range due to being high or low. Out of range low data should not be used in averages since it is an indication of CEMS failure. Out of range high data should not be used in averages. In the event of over-range data, the span value of the instrument, or the highest validated reading of the instrument should be used in data averages.

- Calibrations – data from calibrations should be excluded from data averages, but should be collected and kept in the monitoring record. Calibration data includes daily zero and span, and periodic QA/QC challenges of the CEMS with standards.

- Malfunctions – data collected during periods of known CEMS malfunction should not be used in the averages.

- Out of Control – data collected during periods of Out Of Control (OOC) should not be used in data averages.

- Startup, Shutdown and Malfunction (SSM) events – SSM events of the process or control device (not of the CEMS) should not be excluded from the monitoring record, and may be used to determine compliance with a relevant standard (40 CFR 63.6(e)(1)(i)).

- Data averaging for CEMS – per 40 CFR 63.8(g)(2), data from CEMS shall be reduced to 1-hour averages computed from four or more data points equally spaced over each 1-hour period, except during periods when calibration, quality assurance, or maintenance activities pursuant to provisions of this part are being performed. See Attachment 4 for details.

- Partial Hours of Source Operation – 40 CFR 60.13(h) states that unless specified in an applicable subpart, partial hours of operation are not to be included in compliance calculations. If the applicable subpart requires that partial hours be included in emission calculations, a partial operating hour will be used if 1) the unit satisfies the subpart's definition of "partial operating hour" and 2) if

at least one data point is collected in each quadrant of operation. Regardless of the subpart's use of partial operating hours for compliance, such hours are still used in the computation of monitor availability.

8.4.2 Sulfur Recovery Unit Tail Gas Units

The Lemont Sulfur Recovery Plant is comprised of two Sulfur Recovery Units (Units 119 and 121), each having two trains (119A- and 119B-trains, and 121C- and 121D-trains). Unit 119 is equipped with a single tail gas unit, which is followed by two parallel tail gas oxidizers. Each Unit 121 train has a tail gas absorber following the train, and each of those absorbers is followed by a tail gas oxidizer. Sulfur Dioxide (SO2) and Oxygen (O2) monitoring systems are on the outlet of each tail gas oxidizer.

Sulfur Dioxide (SO_2) and Oxygen (O_2) are sampled at least once every 15 minutes. The SO_2 ppm value is given as a dry value with a correction for oxygen to 0% O_2. The equation used to correct to zero percent excess air is found in 40 CFR 60.106(h)(6). The SO_2 values corrected to 0% O_2 are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS – Vivicom, or VCEMS).

For compliance purposes, analyzer data is read from PI as one hour averages and hourly rolling 12-hour averages for comparison against the standard. Hourly and 12-hour averages can also be produced through the DAHS. The daily calibration results are retained in the DAHS.

Reports shall be submitted on a semi-annual basis in accordance with RMACT II. All monitor malfunctions, certification results, twelve hour rolling periods greater than the standard, and SSMP events will be reported.

8.4.3 FCCU

8.4.3.1 CO

Carbon Monoxide (CO) is sampled at least once every 15 minutes. The CO ppm value is given as a dry value with no correction for oxygen. The CO values are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS). For compliance purposes, analyzer data is presented as one hour averages for comparison to the regulatory standards and as daily rolling 365-day averages for comparison with the NSR CD standards.

Daily calibration data is recorded and maintained on the DAHS. Reports shall be submitted on a semi-annual basis in accordance with RMACT II. All monitor malfunctions, certification results, one hour periods greater than the standard, and SSMP events will be reported.

8.4.3.2 SO2

In-situ Sulfur Dioxide (SO_2) is sampled at least once every 15 minutes. The SO_2 ppm value is given as a dry value with a correction for oxygen to 0% O_2. The SO_2 values corrected to 0% O_2 are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS). For compliance purposes, analyzer data is presented as daily averages on a 7-day rolling average basis for comparison to the regulatory standard and as daily rolling 365-day averages for comparison with the NSR CD standards.

Daily calibration data is recorded and maintained on the DAHS. Reports shall be submitted on a semi-annual basis in accordance with NSPS Subpart J. All monitor malfunctions, certification results, and 7-day rolling averages and 365-day averages greater than the applicable standard will be reported.

8.4.3.3 NOx

Nitrogen Oxide (NO_X) is sampled at least once every 15 minutes. The NOx ppm value is given as a dry value with a correction for oxygen to 0% O_2. The NO_X values are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS). For compliance purposes, analyzer data is presented as daily averages on a 7-day rolling average basis and as daily rolling 365-day averages for comparison with the NSR CD standards.

Daily calibration data is recorded and maintained on the DAHS. Reports shall be submitted on a semi-annual basis. All monitor malfunctions, certification results, one hour periods greater than the standard, and SSMP events will be reported.

8.4.3.4 H2O

In-situ stack moisture (H_2O) is sampled at least once every 15 minutes. The H2O value is used to correct the CO, SO_2, NO_X, and O2 values to a dry basis. The H_2Ovalues are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS). For compliance purposes, analyzer data is presented as daily averages on a 7-day rolling average basis for comparison to the regulatory standard.

Daily calibration data is recorded and maintained on the DAHS. Reports shall be

submitted on a semi-annual basis in accordance with NSPS Subpart J. All monitor malfunctions, certification results, and 7-day rolling averages greater than the applicable standard will be reported

8.4.3.5 O2

In-situ Oxygen (O_2) is sampled at least once every 15 minutes. The O_2 ppm value is given as a dry value. The dry O_2 values are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS). For compliance purposes, these results are used to correct the CO, NOx, and SO2 data noted above.

Daily calibration data is recorded and maintained on the DAHS. Reports shall be submitted on a semi-annual basis in accordance with NSPS Subpart J. Monitor malfunctions of O_2 are reported with monitor malfunctions of the parameter that O_2 is used to correct.

8.4.3.6 Flue Gas Analyzer

The FCCU's 8th floor flue gas analyzer is not considered a true CEMS but rather CPMS. It is used to determine the coke burn rate for compliance with RMACT II and NSPS J. The analyzer is calibrated and maintained in accordance with manufacturer recommendations, meeting the requirements of Table 41 of RMACT II. It is included in this procedure so the maintenance requirements and reaction to downtime can be applied to avoid extended periods of malfunction.

8.4.4 H2S in Fuel Gas and Flare Gas

Hydrogen Sulfide (H_2S) is sampled at least once every 15 minutes. Periods of excess emission are all rolling 3-hour periods during which the average concentration of H_2S, as measured by the H_2S continuous monitoring system, exceeds 162 ppm. The H_2S readings are maintained in PI (data historian).

Daily calibration data for each analyzer is recorded in the Data Acquisition System (Vivicom, or VCEMS).. Reports shall be submitted on a semi-annual basis in accordance with NSPS Subpart J. All monitor malfunctions, certification results and all rolling 3-hour averages greater than the applicable standard will be reported. There is no requirement in NSPS Subpart J that these monitors are to follow the guidelines specified in 40 CFR 60 Appendix F, however the H2S analyzers on the South Plant Fuel Gas system and the 118/122 Fuel Gas system are subject to the guidelines in 40 CFR 60 Appendix F as required by NSPS Ja.

8.4.5 Process Heaters

8.4.5.1 CEMS 111B-1A,111B-1B,111B-2

Nitrogen Oxides (NO_x) is sampled at least once every 15 minutes. The NO_x emission limits for process heaters vary throughout the refinery; limits can be located in the EOLs for the associated process unit. An O_2 analyzer is required since the measurement of oxygen in the flue gas is required to convert NO_x CEMS data to units of the emission standard. A moisture analyzer (H_2O) is required to correct the *in-situ* readings for NO_X and O_2 to a dry basis. The NO_X and O_2 analyzer readings are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS – Vivicom, or VCEMS).

Daily calibrations are maintained on the DAHS. Reports shall be submitted on a semi-annual basis. All monitor malfunctions and certification results will be reported.

Carbon Monoxide (CO) is sampled at least once every 15 minutes. The CO ppm value is given as a dry value with no correction for oxygen. The CO values are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS).

Daily calibration data is recorded and maintained on the DAHS. Reports shall be submitted on a semi-annual basis in accordance with RMACT II. All monitor malfunctions, certification results, one hour periods greater than the standard, and SSMP events will be reported.

8.4.5.2 590H-1 and 590H-2

Nitrogen Oxides (NO_x) is sampled at least once every 15 minutes. The NO_x emission limits for process heaters vary throughout the refinery; limits can be located in the EOLs for the associated process unit. An O_2 analyzer is required since the measurement of oxygen in the flue gas is required to convert NO_x CEMS data to units of the emission standard. A moisture analyzer (H_2O) is required to correct the *in-situ* readings for NO_X and O_2 to a dry basis. The NO_X and O_2 analyzer readings are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS – Vivicom, or VCEMS).

Daily calibrations are maintained on the DAHS. Reports shall be submitted on a semi-annual basis. All monitor malfunctions and certification results will be reported.

8.4.5.3 123-B2 PEMS

123B-2 process heater utilizes a parametric emission monitoring system (PEMS) for measuring and recording NOx emissions.

Daily evaluations of input sensors are monitored by SmartCEMS® PEMS software. All monitor malfunctions, certification results, and measurements greater than the applicable standard will be reported.

8.4.6 Boilers

8.4.6.1 430B-1, Auxiliary Boiler

The Auxiliary Boiler (430B-1) is equipped with a Low NO_X Burner system coupled with a Flue Gas Recirculation System. Nitrogen Oxides (NO_X) and Oxygen (O_2) is sampled at least once every 15 minutes. An O_2 analyzer is required since the measurement of oxygen in the flue gas is required to convert NO_x CEMS data to units of the emission standard. The NO_X and O_2 analyzer readings are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS – Vivicom, or VCEMS).

Daily calibrations are maintained on the DAHS. Reports shall be submitted on a semi-annual basis. All monitor malfunctions and certification results will be reported. Further, emissions data for this boiler will be submitted electronically using U.S. EPA's ECMPS reporting tool, to satisfy the remaining requirements of the NOx Budget Trading Program (40 CFR 96, referencing 40 CFR Part 75).

Carbon Monoxide (CO) is sampled at least once every 15 minutes. The CO ppm value is given as a dry value with no correction for oxygen. The CO values are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS).

Daily calibration data is recorded and maintained on the DAHS. Reports shall be submitted on a semi-annual basis in accordance with RMACT II. All monitor malfunctions, certification results, one hour periods greater than the standard, and SSMP events will be reported.

8.4.7 Flares

Flares C-1, C-2 and C-3 are equipped with Total Reduced Sulfur (TRS) analyzers. The gas in each flare header is sampled at least once every 15 minutes. The TRS analyzer readings are maintained in PI (data historian) and a Data Acquisition and Handling System (DAHS – Vivicom, or VCEMS).

Daily calibrations are maintained on the DAHS. Reports shall be submitted on a semi-annual basis in accordance with NSPS Subpart Ja. All monitor malfunctions,

certification results, and SO2 mass totals in a 24-hour period greater than the applicable standard will be reported.

8.5 Accuracy Audit Procedures

The audit frequency and accuracy requirements for the Lemont CEMS analyzers can be found in Attachments 1, 2 and 3 at the end of this procedure.

8.6 Quality Assurance/Quality Control

The Maintenance Instrumentation Department is responsible for operation and maintenance of all monitoring equipment. Operations personnel monitor the affected sources and their control devices for exceedances of regulatory limits and monitoring malfunctions. In case of a monitor malfunction, notification of an analyzer technician follows the procedures as listed in Sections 8.7 of this plan. The Analyzer Specialist & Process Control is responsible for data collection, validation, reporting and recordkeeping. Specific personnel assignments (by function) include the following:

- CEMS Subject Matter Expert (Environmental Department)
- Operator (Process unit to which operator is assigned)
- Analyzer technician (Power & Control Maintenance Department)

8.6.1 Initial CEMS Performance Tests

After installation of the CEMS, the following two tests must be performed successfully during or within 30 days of source Performance Testing:

Seven-day Calibration Drift Test – Determine the magnitude of the calibration drift (CD) once each day (at 24-hour intervals) for 7 consecutive days while the affected facility is operating at more than 50 percent of normal load, or as specified in the applicable subpart. If periodic automatic or manual adjustments are made to the CEMS zero and calibration settings, conduct the CD test immediately before these adjustments, or conduct it in such a way that the CD can be determined. Conduct the CD test at the zero and high-level values. Calculate the daily CD at the zero and high-level value calibrations. The daily CD must not drift or deviate from the reference value of the gas cylinder, gas cell or optical filter by more than the percentage specified in the applicable performance

specification of the span value. If the CEMS includes pollutant and diluent monitors (i.e., O2) the CD must be determined separately for each in terms of concentrations.

Relative Accuracy Test Audit (RATA) – The RATA is conducted by performing 9 sets of stack tests with the reference method. The RATA must be conducted while the affected facility is operating at more than 50 percent of normal load. The RATA test may be conducted during the CD test period. Conduct the Reference Method (RM) tests in such a way that they will yield results representative of the emissions from the source and can be correlated to the CEMS data. The detailed procedure for conducting the RATA is found in the applicable Performance Specifications (PS) and should be followed for all annual RATA.

8.6.2 Out of Control Procedure

Out Of Control is determined when the daily calibration drift measurements indicate significant loss of instrument precision. When conflicting definitions of Out Of Control occur, 40 CFR Part 60 Appendix F should govern, see Attachment 1.

NOTE: A validation compares the analyzer reading with the expected value without making an adjustment to the analyzer reading. In the event a validation shows the analyzer to be outside acceptable daily calibration ranges, it will automatically alarm:

1. If the fifth consecutive daily calibration drift (either zero or span) exceeds 2 times the drift specification from the applicable performance specification;
2. If any daily calibration drift (either zero or span) exceeds 4 times the drift specification from the applicable performance specification; or
3. If the CEMS fails a RATA or CGA.

Drift and RA Specs – Calibration Drift and Relative Accuracy (RA) specifications can be found in Attachment 1.

Out-of-Control Corrective Action – Once “Out Of Control” is declared, corrective action is required. Data from the CEMS cannot be accepted until a successful recalibration of the CEMS has been completed. An analyzer technician must be called out to address the analyzer Out Of Control event. Analyzer personnel that perform daily calibrations will review the calibration drift from the previous calibration. If the calibration drift exceeds one of the limits found in Attachment 1, then the CEMS is considered “Out Of Control”:

8.7 CEMS Malfunction Procedure

8.7.1 Identification of Analyzer Malfunctions

DAHS records all Malfunction Alarms and downtime. When a CEMS analyzer alarms, the console on shift should utilize appropriate unit operating guidelines to ascertain if the cause is a CEMS equipment failure or a process upset.

If it is determined to be a CEMS malfunction:

- Complete Malfunction/Deviation report, include a copy to the appropriate people in the Environmental Department
- Follow the steps outlined in 8.7.2.
- Monitor unit operations closely until analyzer is returned to service

8.7.2 Non-routine Analyzer Maintenance

Regular Work Week Hours:

- Console notifies the Unit Supervisor
- The Unit or console Supervisor then notifies the Analyzer Department.

Weekend, Holiday, After Regular Hours:

- The console operator notifies the Shift Superintendent.
- The Shift Superintendent will call out an Analyzer technician.
- Analyzer Technician will report to work on the analyzer and return the analyzer to service if possible.
    - If the issue cannot be resolved, the Analyzer Technician will notify the Analyzer Specialist/Analyzer Coordinator & Shift Superintendent.
    - The Specialist/Analyzer Coordinator then contacts the Shift Superintendent to discuss path forward.
    - If replacement parts, or service, are required off-shift contact the on-call purchasing agent to process the order in a timely manner; on-call information can be found on the Purchasing webpage.

8.8 CEMS Excessive Inaccuracies/Downtime

CEMS downtime will be monitored by the Environmental Department on a monthly basis; Analyzer department personnel will provide explanation for downtime events.

If a CEMS analyzer exceeds 5% downtime for one quarter, regardless of cause, the following will occur:

- Environmental Department will notify Analyzer Specialist of the downtime issue.
- Analyzer Department will conduct a review of the PM and QA/QC for the analyzer and determine if any modifications to procedures are required.
- Any necessary changes will be made to the procedures, or equipment, and implemented by the Analyzer Department

If a CEMS analyzer exceeds 5% downtime for two consecutive quarters, regardless of cause, the following will occur no later than 45 days after the triggering event:

- A 3333 will be called
- IMPACT system will be utilized to do the following:
  - Assemble an investigation team
  - Conduct investigation
  - Determine appropriate corrective actions
  - Assign action items and appropriate deadlines to undertake as expeditiously as possible
  - Track progress relative to deadlines
  - Prepare a root cause/corrective action report
  - Update CEMS OM Plan as needed
- Any CEMS analyzer requiring a 3333 twice in three years should utilize manufacturer input during investigation.
  - By no later than 120 days after the second root cause/corrective action report, the third party shall provide a written report including any additional corrective actions they deem appropriate.

9.0 REFERENCES

9.1 Regulatory

- 40 CFR Part 51 Appendix P
- 40 CFR Part 60 Subparts A, Db, H and J, Ja
- 40 CFR Part 60 Appendix A, B and F
- 40 CFR Part 63 Subparts A and UUU
- 40 CFR Part 75 Subpart C, Appendix B
- 40 CFR Part 98 (GHG)
- 35IAC, Parts 214, 216, 217 and 218
- 2017 Consent Decree

9.2 Related Policies/Procedures

- MNT-001 Calibration of Continuous Gas Analyzers
- MNT-002 Calibration of Gas Chromatograph (GC)
- MNT-003 Preventive Maintenance of Process Analyzers
- CITGO Lemont Refinery PEMS Monitoring Protocol

9.3 Attachments

Attachment 1 - Drift and Relative Accuracy Specifications
Attachment 2 - Regulatory Summary RATA and CGAs for FCCUs
Attachment 3 - Regulatory Summary RATA and CGAs for Heaters and Boilers, Sulfur Plant and H2S fuel gas monitors
Attachment 4 - Determination of a Valid Hour for Reporting Purpose
Attachment 5 – Refinery Compliance Obligation Points
Attachment 6 – Associated Maintenance Procedures

Revisions

5-7-13 Removed 8.6.3 Daily Calibration Procedure, moved regulation citations to 8.2 covering Cal and Drift Adjustment

6-18-13 Added Sections 8.7 and 8.8

6-24-13 Added 40cfr part 75 to definitions sections.

9-23-13 Updated Related Procedures with Maintenance Procedures

Rewrote 8.3 to include reference of Maint. Procedures

Added 8.4.7 to include 123 PEMS into OM Plan

2-19-14 Removed Note from 8.1.2 as it is defined elsewhere in the document.

3-16-15 Updated maintenance procedures

Included CO requirements for Heaters/Boilers, including Attachment 1 in Tables

Updated to include 109B-62

5-31-15 Inserted Attachments as pictures.

4-21-16 Annual review and update

Added Flare sulfur analyzers

Updated QA requirements to include fuel gas H2S analyzers subject to Ja (Tables)

Updated RATA requirements to include unit operation requirements (Tables)

1-13-17 Added Unit 590 NOx analyzers, 590H-1 and 590 H-2, including updating tables with requirements

Removed NC Fuel Gas H2S analyzer, exempt from monitoring as Unit 109 is using only inherently low sulfur fuel gas (natural gas)

Removed PSA Purge Gas H2S analyzer, exempt from monitoring as Unit 109 is using only inherently low sulfur fuel gas(natural gas)

Removed North Plant Boiler analyzers (NOx/O2), boiler decommissioned in 2016; fuel gas H2S analyzer is still in use for Temp Boilers

Added 2017 Consent Decree as a Reference and included new limits for certain sources

Attachment 1
Drfit and Relative Accuracy Specifications
CITGO Lemont Refinery

Source	Pollutant CEM	Emission Standard	Span	Calibration Levels		Calibration Drift Limits		Certification	PS	CGA Levels		CGA (Linearity for Part 75) Requirements	Unit Operating Conditions During Stack Testing	RATA Requirements [1]	
				Low Level Cal	High Level Cal	1-Day CD Limit**	5-Day CD Limit*	Ref. Method		Low Level CGA	High Level CGA	%RM mean		%RM mean	% Emission Standard
FCCU	CO	500ppmv, db, 0% O2, 200ppmv @ 50% excess air	750 ppm	0-20% Span	50-100% Span	20% Span	10 % Span	10	PS-4	20-30% Span	50-60% Span	15		10	5
FCCU	O2	NA	10%	0 - 2 %	5 - 10 %	2%	1%	3a	PS-3	4-6% by Vol	8-12% by Vol	15	>50% of Normal Load for RATAs	20	1% difference
FCCU	H2O	NA													
FCCU	NOx	40ppmv db, 0% O2	100 ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-2	20-30% Span	50-60% Span	15	At or near normal operating coke burn rate (~90% of average annual coke burn rate for the previous 12 months)	20	10
FCCU	SO2	50ppmv, db, 0% O2	100 ppm	0-20% Span	50-100% Span	10 % Span	5% Span	6	PS-2	20-30% Span	50-60% Span	15		20	10
FCCU	8th Floor Flue Gas GC[2]	18 hours valid data for daily burn rate	NA	NA	NA	NA	NA	NA	NA			NA		NA	NA
119A-train	SO2	250ppmv, db, 0% O2	500 ppm	0-20% Span	50-100% Span	10% Span	5% Span	6	PS-2	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
119B-train	SO2	250ppmv, db, 0% O2	500 ppm	0-20% Span	50-100% Span	10% Span	5% Span	6	PS-2	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
A&B trains	O2	NA	25%	0 - 5 %	12.5 - 25 %	2%	1%	3a	PS-3	4-6% by Vol	8-12% by Vol	15	>50% of Normal Load	20	1% difference
121C-train	SO2	250ppmv, db, 0% O2	500ppm	0-20% Span	50-100% Span	10% Span	5% Span	6	PS-2	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
121D-train	SO2	250ppmv, db, 0% O2	500ppm	0-20% Span	50-100% Span	10% Span	5% Span	6	PS-2	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
C&D trains	O2	NA	10%	0 - 2 %	5-10 %	2%	1%	3a	PS-3	4-6% by Vol	8-12% by Vol	15	>50% of Normal Load	20	1% difference
111B-1A	NOx	40ppmv, db, 0% O2	100ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-2	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
111B-1B	NOx	40ppmv, db, 0% O2	100ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-2	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
111B-2	NOx	40ppmv, db, 0% O2	100ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-2	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
Crude Heaters (CEMS)	O2	NA	10%	0 - 2 %	5-10 %	2%	1%	3a	PS-3	4-6% by Vol	8-12% by Vol	15	>50% of Normal Load	20	1% difference
430B-1 Aux Boiler	NOx	0.055lb/MMBtu[3]	100ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-2	20-30% Span	50-60% Span	5	>50% of Normal Load	20	10
430B-1 Aux Boiler	O2	NA	10%	0-20% Span	50-100% Span	2%	1%	3a	PS-3	4-6% by Vol	8-12% by Vol	5	>50% of Normal Load	20	1% difference
109B-62	NOx	0.16 lb/MMBtu	200ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-3	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
590 H-1	NOx	0.040 lb/MMBtu at 0% O2 until 3/31/2017 0.020 lb/MMBtu at 3% O2 after 3/31/2017	80ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-3	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
590H-1	O2	NA	10%	0 - 2 %	5-10 %	2%	1%	3a	PS-3	4-6% by Vol	8-12% by Vol	15	>50% of Normal Load	20	1% difference
590 H-2	NOx	0.040 lb/MMBtu at 0% O2 until 3/31/2017 0.020 lb/MMBtu at 3% O2 after 3/31/2017	80ppm	0-20% Span	50-100% Span	10% Span	5% Span	7E	PS-3	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
590H-2	O2	NA	10%	0 - 2 %	5-10 %	2%	1%	3a	PS-3	4-6% by Vol	8-12% by Vol	15	>50% of Normal Load	20	1% difference
All Heaters Above 10mmBTU/hr with CO CEMS	CO	200ppm 3-hr ave, 50% excess air	300-600ppm	0-20% Span	50-100% Span	20% Span	10 % Span	10	PS-4	20-30% Span	50-60% Span	15	>50% of Normal Load	20	5
SP FG	H2S	162 ppm	300ppm	0-20% Span	50-100% Span	20% Span	10 % Span	11	PS-7	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
114-116 FG (Dual Service A)	H2S	162 ppm	300ppm	0-20% Span	50-100% Span	20% Span	10 % Span	11	PS-7	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
115-125 FG (Dual Service A)	H2S	162 ppm	300ppm	0-20% Span	50-100% Span	20% Span	10 % Span	11	PS-7	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
118-122	H2S	162 ppm	300ppm	0-20% Span	50-100% Span	20% Span	10 % Span	11	PS-7	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
123 FG (Dual Service C)	H2S	162 ppm	300ppm	0-20% Span	50-100% Span	20% Span	10 % Span	11	PS-7	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
NPTemp Blr FG (Dual Service C)	H2S	162 ppm	300ppm	0-20% Span	50-100% Span	20% Span	10 % Span	11	PS-7	20-30% Span	50-60% Span	15	>50% of Normal Load	20	10
123B-2 PEMS	Refer to "PEMS Requirements Attachment"														
C1 Flare Total Sulfur	Total Reduced Sulfur (TRS)	500lb in 24hr period	6500 ppm	0-20% Span	50-100% Span	20% Span	10 % Span	15A	PS-5	20-30% Span	50-60% Span	15	NA- Modified CGA in lieu	NA	NA
C2 Flare Total Sulfur	Total Reduced Sulfur (TRS)	500lb in 24hr period	1000000 ppm	0-20% Span	50-100% Span	20% Span	10 % Span	15A	PS-5	20-30% Span	50-60% Span	15	NA- Modified CGA in lieu	NA	NA
C3 Flare Total Sulfur	Total Reduced Sulfur (TRS)	500lb in 24hr period	1000000 ppm	0-20% Span	50-100% Span	20% Span	10 % Span	15A	PS-5	20-30% Span	50-60% Span	15	NA- Modified CGA in lieu	NA	NA

* When the expected calibration gas and the analyzer reading differ by greater than the listed values, the analyzer should be recalibrated to bring the analyzer reading closer to the expected reading. After the fifth consecutive day, at this calibration difference or greater, the analyzer is considered out of control.

** When the expected calibration gas and the analyzer reading differ by greater than the listed values, the analyzer has failed calibration and data can no longer be used, going back to the last good calibration, for demonstrating compliance. Immediate attention by an analyzer technician is required.

1 When the average emission during the test are greater than 50% of the emission standard, the Reference Method (RM) mean is used as the RATA standard, otherwise use the emission standard basis for comparison.
2 Not considered a true CEMS, included to ensure maintenance is handled in a timely manner

Attachment 2

Annual RATA and CGA Requirements FCCU

CITGO Lemont Refinery

CEMS	RATA/CGA	NSPS	RMACT II	NSR Consent Decree	Title V Permit	Resulting Actions.
CO	RATA	Annually Part 60 Appendix F	Annually Part 63 Subpart UUU Table 40	Triennially NSR CD Paragraph 12	Triennially 7.3.3.2 (b)	Annually (per RMACT)
	CGA	Quarterly Part 60 Appendix F	No	Quarterly NSR CD Paragraph 12	Quarterly 7.3.3.2 (b)	Quarterly
NOx	RATA	Annually Part 60 Appendix F	N/A	Triennially NSR CD Paragraph 12	Triennially 7.3.3.2 (b)	Triennially (per CD)
	CGA	Quarterly Part 60 Appendix F	N/A	Quarterly NSR CD Paragraph 12	Quarterly 7.3.3.2 (b)	Quarterly
SO_2	RATA	Annually Part 60 Appendix F	N/A	Triennially NSR CD Paragraph 12	Triennially 7.3.3.2 (b)	Triennially (per CD)
	CGA	Quarterly Part 60 Appendix F	N/A	Quarterly NSR CD Paragraph 12	Quarterly 7.3.3.2 (b)	Quarterly
O_2	RATA	Annually Part 60 Appendix F	Annually Part 63 Subpart UUU Table 40	Triennially NSR CD Paragraph 12	Triennially 7.3.3.2 (b)	Annually (per RMACT)
	CGA	Quarterly Part 60 Appendix F	No	Quarterly NSR CD Paragraph 12	Quarterly 7.3.3.2 (b)	Quarterly
CO_2	RATA	N/A	N/A	N/A	N/A	Triennially (Voluntary)
	CGA	N/A	N/A	N/A	N/A	No

Attachment 3

Annual RATA and CGA Requirements - Boilers and Heaters, Sulfur Plant, and Refinery Fuel Gas

CITGO Lemont Refinery

Unit	CEMS	RATA/CGA	NSPS	RMACT II	NSR Consent Decree	35IAC	Title V Permit	Resulting Actions.
SRU/TGU	SO2 /O2	RATA	Annually Subpart Ja	Annually	Annually Subpart Ja	N/A	Annually	Annually
		CGA	Quarterly Subpart Ja	Quarterly	Quarterly Subpart Ja	N/A	Quarterly	Quarterly
Aux Boiler 430B-1	NOx / CO / O2	RATA	Annually Part 75	N/A	No	N/A	Yes	Annually[1]
		Linearity Check	Quarterly Part 75	N/A	No	N/A	No	Quarterly
Heaters, 111B-1A, 111B-1B, 111B-2	NOx / CO / O2	RATA	Annually Part 60 Appendix F	N/A	Triennially, NSR CD (Paragraph 60)	Annually 35AIC 217.157	Reference to CD	Annually (per 35IAC 217.157)
		CGA	Quarterly Part 60 Appendix F	N/A	Quarterly, NSR CD (Paragraph 60)	Quarterly 35IAC 217.157	Reference to CD	Quarterly
Heaters, 109B-62	NOx / CO / O2	RATA	Quarterly Part 60 Appendix F	N/A	N/A	Annually 35AIC 217.157	N/A	Annually
		CGA	Quarterly Part 60 Appendix F	N/A	N/A	Quarterly 35IAC 217.157	N/A	Quarterly
Heaters, 590 H-1, 590 H-2	Wet O2	RATA	Annually NSPS Ja 107a (d) 8	N/A	N/A	N/A	N/A	Annually
		CGA	Quarterly NSPS Ja 107a (c) 5	N/A	N/A	N/A	N/A	Quarterly
Flares, C-1, C-2, C-3	Total Reduced Sulfur	RATA	Annually NSPS Ja 107a (e) (1)	N/A	N/A	N/A	N/A	Annually[2]
		CGA	Quarterly NSPS Ja 107a (e) (1)	N/A	N/A	N/A	N/A	Quarterly
Refinery Fuel Gas	H2S	RATA	Annually NSPS Ja (Appendix F by reference) SP Fuel Gas and 118/122 Fuel Gas	N/A	N/A	N/A	N/A	Annually (SP Fuel Gas and 118/122 Fuel Gas)
		CGA	Quarterly NSPS Ja (Appendix F by reference) SP Fuel Gas and 118/122 Fuel Gas	N/A	N/A	N/A	N/A	Quarterly (SP Fuel Gas and 118/122 Fuel Gas)

1 NOx SIP part 75 requires Q1 RATA for Aux Boiler

2 Alternate test procedure from PS-5 allows for modified CGA in lieu of annual Rata

Attachment 4

Hourly Data Validation Regulatory Requirements

CITGO Lemont Refinery

Regulation	Defining Subpart	Pollutant	Regulatory Citation	Min. No. of valid readings / 15 min period	Min. No. of valid quadrants per hour of "process on" that excludes a QC outage[1,2,5]	Min. No. of valid quadrants per hour of "process on" that includes a QC outage[1,2,6]	Readings must be "equally spaced" over the hour[3]	Valid hour if it contains less than 45 minutes of "process on"	Applicable CEMS	Valid Day Minimum Data Requirements	Comments
NSPS	Subpart A	Any	60.13 (h)(2)	1	4	2	Yes	Yes[4,5]	FCCU SO2 & O2, SRU's SO2		
RMACT II	Subpart A	Any	63.8 (g)(2)	1	4	2	Yes	No	FCCU CO, TGU RSC		

1 There are two ways of reading this rule. These are as follows:

A. Accept any hour with more than 30 minutes of operating time ("process on") and with at least one reading in each 15 minute period.

B. Accept any hour that meets any of the following:

(a) 30 minutes of "process on" with 1reading in each of 2 quadrants,

(b) 30-45 minutes of "process on" with 1reading in each of 3 valid quadrants, and

(c) 41-60 30 minutes of "process on" with 1reading in each of 4 valid quadrants (i.e. follow Part 60 Subpart A).

2 There must be at least two data points separated by a minimum of 15 minutes per 60.13(h)(2)(iii)(A).

3 "Equally spaced" is satisfied by having at least 1- one minute reading in a 15 minute quadrant.

4 "Equally spaced" is applicable by the reference to 60.13 (h).

5 Rule allows (arguably) a valid hour to be as little as one quadrant with one reading if the unit has 15 minutes of process up time per 60.13(h)(2)(iii)(B).

6 The Part 60 Subpart A rules details the minimum data requirements on hours when a calibration or necessary maintenance is performed, therefore this defaults to the standard rules for an hour as found in 60.13(h)(2). It is not specified in 60.48b(d).

7 All 40 CFR Part 63 (NESHAP) CEMS requirements are identified as RMACT II requirements.

Attachment 5

Refinery Compliance Obligation Points related to CEMS/CMS

CITGO Lemont Refinery

Source	*Pollutant*	*Applicable Requirement(s)*	*Limit*	*Units of Measure*	*Period*	*Calculation Basis*
FCCU	CO	NSPS Subpart J / RMACT II	500	ppm	1 hour block	No O2 correction, dry
	CO	35 IAC 216.361(a)	200	ppmv	1 hour block (not specified)	50% excess air, dry
	CO	NSR CD	500	ppm	1 hour block	O2-free, dry
	CO	NSR CD	100	ppm	365 day rolling average	O2-free, dry
	NOx	NSR CD/Title V Permit	40	ppm	7 day rolling average	O2-free, dry
	NOx	NSR CD/Title V Permit	20	ppm	365 day rolling average	O2-free, dry
	SO2	NSPS Subpart J / RMACT II	50	ppm	7 day rolling average	O2-free, dry
	SO2	NSR CD/Title V Permit	25	ppm	365 day rolling average	O2-free, dry
	H2O/O2	Not specifically called out in RMACT II or NSPS J or Title V permit, but is a necessary parameter to correct results	NA	NA	NA	NA
119 A-train	SO2	NSPS Ja, RMACT II, NSR CD	250	ppm	Hourly, 12 hour average	0% excess air (equiv. to 0% O2), dry
119 B-train	SO2	NSPS Ja, RMACT II, NSR CD	250	ppm	Hourly, 12 hour average	0% excess air (equiv. to 0% O2), dry
121 C-train	SO2	NSPS Ja, RMACT II, NSR CD	250	ppm	Hourly, 12 hour average	0% excess air (equiv. to 0% O2), dry
	SO2	35IAC, 214.301	2000	ppm	1 hour block (not specified)	No O2 Correction noted, assumed dry
121 D-train	SO2	NSPS Ja, RMACT II, NSR CD	250	ppm	Hourly, 12 hour average	0% excess air (equiv. to 0% O2), dry
	SO2	35IAC, 214.301	2000	ppm	1 hour block (not specified)	No O2 Correction noted, assumed dry
	O2	Not specifically called out in RMACT II or NSPS J or Title V permit, but is a necessary parameter to correct results	NA	NA	NA	NA
SP fuel gas, 114/116 fuel gas, 115/125 fuel gas, 118/122 fuel gas, 123 fuel gas, NP Boiler fuel gas	H2S in Fuel Gas	NSPS J, NSR CD, Title V Permit, NSPS Ja (SP fuel gas to U590 and NP Boiler fuel gas)	162	ppm	3 hour rolling average	No O2 Correction
SP fuel gas, 118/122 fuel gas	H2S in Fuel Gas	NSPS Ja	60	ppm	daily rolling 365-day average	No O2 Correction
111B-1A	NOx	NSR CD, Title V Permit (Cond. 7.1.12.e.), 35IAC 217 Subparts D,F	0.04	lb/MMBtu	monthly average (not specified)	O2-free, dry
111B-1B	NOx	NSR CD, Title V Permit (Cond. 7.1.12.e.), 35IAC 217 Subparts D,F	0.04	lb/MMBtu	monthly average (not specified)	O2-free, dry
111B-2	NOx	Title V Permit (Cond. 7.1.12.e.), 35IAC 217 Subparts D,F	0.052	lb/MMBtu	monthly average (not specified)	O2-free, dry (assumed)
590 H-1 and 590 H-2	NOx	NSPS Ja 107a (e) (1)	0.040	lb/MMBtu	30-day average	dry 0% O2, limit applicable until 3/31/2017
590 H-1 and 590 H-2	NOx	2017 CD paragraph 14b	0.020	lb/MMBtu	30-day average	dry 3% O2, limit applicable after 3/31/2017
430B-1 (Aux boiler)	NOx	35 IAC 217 Subparts F and U, 40 CFR 96 (by reference in 35 IAC 217 Subpart U), 40 CFR 75(by reference in Part 96). No firm "limit" established in 35 IAC 217 U. The "limit" noted here is a mass "allowance", above which emissions credits would need to be obtained. The Federal Trading Program under Part 96 is no longer supported, and the "settling up" occurs at the state level.	23	Tons/ ozone season	Quarterly report (EDR) hourly data: q2: May, Jun only q3: Jul, Aug, Sept	O2-free, dry
	NOx	NSR CD. "Limit" here is the design target for qualifying controls, per paragraph 53.e..	0.055	lb/MMBtu	Not specified.	Not specified
The set of: 111B-1A, 111B-1B, 111B-2, 109B-62, 123B-2, 430B-1, 431B-20	NOx	35 IAC 217 Subparts D, E, F (IEPA NOx RACT, Effective beginning 1/1/2015) By reference in 35 IAC 217 Subpart D: - 40 CFR 60 Subpart A and Appendix B (applicable to boilers and process heaters >100 MMBtu/hr and ≤250 MMBtu/hr) - 40 CFR Part 75 (applicable only boilers >250 MMBtu/hr)	0.08	lb/MMBtu	Average across the set of heaters/boilers >100 MMBtu/hr, emitting > 5 T NOx/ozone season or 15 T NOx/yr, and equipped with CEMS/PEMS, over the following periods: - Ozone ssn (May thru Sep) - Calendar year	O2-free, dry. Note 123B-2 to use a PEMS (Predictive Emissions Monitoring System), meeting the requirements of 40 CFR 60 Appendix B, PS 16
	H2O/O2	Not specifically called out in RMACT II or NSPS J or Title V permit, but is a necessary parameter to correct results	NA	NA	NA	NA
111B-1A	CO	35 IAC 216.121	200	ppmv	1 hour block (not specified)	50% excess air, dry
	CO	Title V permit (Cond. 7.1.12.e.)	0.012	lb/MMBtu	monthly average (not specified)	O2-free, dry
111B-1B	CO	35 IAC 216.121	200	ppmv	1 hour block (not specified)	50% excess air, dry
	CO	Title V permit (Cond. 7.1.12.e.)	0.012	lb/MMBtu	monthly average (not specified)	O2-free, dry
111B-2	CO	35 IAC 216.121	200	ppmv	1 hour block (not specified)	50% excess air, dry
	CO	Title V permit (Cond. 7.1.12.e.)	0.08	lb/MMBtu	monthly average (not specified)	O2-free, dry
430B-1	CO	35 IAC 216.121	200	ppmv	1 hour block (not specified)	50% excess air, dry
431B-20	CO	35 IAC 216.121	200	ppmv	1 hr block (not specified)	50% excess air, dry
	CO	Title V permit (Cond. 7.1.12.e.)	0.055	lb/MMBtu	monthly average (not specified)	O2-free, dry
Flares: C-1, C-2 and C-3	Total Reduced Sulfur (TRS)	NSPS Ja 107a (e) (1)	500	lb	Any 24 hour period	Pounds calculated based on dry flow and concentration as measured by analyzers

MNT-A-0001 CALIBRATION: Continuous Gas Analyzer

PURPOSE

This procedure provides actions and guidelines for the calibration of Continuous Gas analyzers.

SCOPE

Applies To:

This procedure is applicable to all analyzer equipment associated with the IMS program, per **IMS-ANALYZER-LIST**.

Note: The CITGO Refinery Analyzer Specialist maintains additional documentation listing the functional locations of process analyzers associated with this procedure.

Exceptions:

This procedure does not apply to portable analyzers or analyzers utilized in the CITGO Lemont Laboratory facility.

GENERAL

Research/Review the following:

- SDS (Safety Data Sheet)
- Lemont Refinery EMERGENCY ACTION and SAFETY MANUAL
- SPS (Safe Practice Standards)
- Equipment specification sheet
- Manufacturer's specifications
- Loop sheets

There are many different methods to calibrate analyzers. Each individual that completes these tasks may have a different idea of requirements necessary to properly inspect and check an analyzer or analyzer loop; these different methods may not include all necessary requirements. This procedure includes and defines the minimum requirements necessary to complete calibration of Continuous Gas Analyzers at the CITGO Lemont Refinery.

DEFINITIONS/ABBREVIATIONS

- **Analyzer:** An instrument that performs analysis to determine, either qualitatively, quantitatively, or both, the component(s) in a mixture. The value(s) representative of the component(s) may be a measurement of purity, or impurity, based on customer needs.
- **Validation:** A test of the analyzer, using calibration standards, to determine if the difference between current readings and the standard are outside accepted tolerances.
- **Calibration:** Adjustments made to the analyzer until the difference between the current readings and the known calibration standard values are within acceptable tolerances. Sometimes this is a manual adjustment, and sometimes it is performed by the analyzer as a part of the sequence.

- **DAHS:** Refers to a data acquisition and handling system, used to collect. Manage and report CEMS data. The Lemont Refinery Data Acquisition System is a Vivicom VCEMS2000 data handling system. It uses an ADM (Analog to Digital Module) to link the analyzer(s) from the field to a central server for further processing, display, or archiving.
- **Inspection:** A check of instrument equipment to ensure that the equipment is functioning properly. This inspection is performed while the equipment is in service and may include visual observations and measurements.
- **CLR:** an abbreviation for "CITGO Lemont Refinery"

RESPONSIBILITIES

Sponsor:

- Manager of Maintenance

Implementation:

- **Initiation:** The Lemont Refinery Analyzer Supervisor/Specialist is responsible for overall program coordination and central documentation management.
- **Performance:** The Lemont Refinery Analyzer Supervisor/Specialist will be responsible for monitoring performance.
- **Audit:** The Analyzer Supervisor and/or Specialist & Environmental Department is responsible for compliance audit(s).

REFERENCES

Regulatory:

- Title 40CFR Part 60 & 75 – Protection of the Environment Continuous Emission Monitoring System (CEMS) Operating and Maintenance
- OSHA 1910.119 Process Safety Management of Highly Hazardous Chemicals

Policies/Procedures:

- Manufacturer Equipment-specific Documentation
- CITGO Petroleum Corporation Lemont Refinery, Engineering and Construction Specifications
- CITGO Petroleum Corporation Lemont Refinery, O&M Environmental Plan
- IMS-ANALYZER –LIST
- MNT-A-0003 Process Analyzer Preventative Maintenance

Attachments/Forms:

- n/a

PROCEDURE STEPS

1.0 Testing and Calibration:

1.1 OBTAIN necessary permissions and permits from Operations prior to removing analyzer from service.

1.2 VERIFY proper calibration standards (gases, optical filters, etc.) are connected to the analyzer.

1.3 If validation/calibration can be completed without disturbing the process, PROCEED in accordance with manufacturer's and CITGO's specifications and procedures.

WARNING

DO NOT touch hot surfaces with bare hands. (ex: lamps, photo-tubes, oven components). After lamps and/or photo-tubes cool, use a clean cloth and methanol to clean surfaces.

1.4 In the event of validation/calibration failure: REPEAT calibration sequence to correct problem. If failure continues, analyzer maintenance will be required.

1.5 REPEAT sequence after any maintenance of the analyzer is completed.

1.6 MONITOR and VERIFY proper operation of analyzer through designated reporting system (such as a local indication, DCS, PI, and/or DAHS), if changes or repairs were performed.

1.7 When completing a validation/calibration sequence of analyzer system connected to DAHS: VERIFY sequence has been initiated each day for the DAHS for the "Time of Day" Auto-validation.

END OF PROCEDURE

MNT-A-0002 CALIBRATION: Gas Chromatographs

PURPOSE

This procedure provides actions and guidelines for the validation and/or calibration of CITGO Lemont Refiner Gas Chromatographs.

SCOPE

Applies To:

This procedure is applicable to all analyzer equipment associated with the IMS program, per **IMS-ANALYZER-LIST**.

Note: The CITGO Refinery Analyzer Specialist maintains additional documentation listing the functional locations of process analyzers associated with this procedure.

Exceptions:

This procedure does not apply to portable analyzers or analyzers utilized in the CITGO Lemont Laboratory facility.

GENERAL

Research/Review the following:

- SDS (Safety Data Sheet)
- Lemont Refinery EMERGENCY ACTION and SAFETY MANUAL
- SPS (Safe Practice Standards)
- Equipment specification sheet
- Manufacturer's specifications

There are many different methods to calibrate gas chromatographs. Each individual that completes these tasks may have a different idea of requirements necessary to properly inspect and check a gas

chromatographs; these different methods may not include all necessary requirements. This procedure includes and defines the minimum requirements necessary to complete calibration of Gas Chromatographs at the CITGO Lemont Refinery.

DEFINITIONS/ABBREVIATIONS

- **Analyzer:** An instrument that performs analysis to determine, either qualitatively, quantitatively, or both, the component(s) in a mixture. The value(s) representative of the component(s) may be a measurement of purity, or impurity, based on customer needs.
- **Validation:** A test of the analyzer, using calibration standards, to determine if the difference between current readings and the standard are outside accepted tolerances.
- **Calibration:** Adjustments made to the analyzer until the difference between the current readings and the known calibration standard values are within acceptable tolerances. Sometimes this is a manual adjustment, and sometimes it is performed by the analyzer as a part of the sequence.
- **DAHS:** Refers to a data acquisition and handling system, used to collect. Manage and report CEMS data. The Lemont Refinery Data Acquisition System is a Vivicom VCEMS2000 data handling system. It uses an ADM (Analog to Digital Module) to link the analyzer(s) from the field to a central server for further processing, display, or archiving.
- **Inspection:** A check of instrument equipment to ensure that the equipment is functioning properly. This inspection is performed while the equipment is in service and may include visual observations and measurements.
- **CLR:** an abbreviation for “CITGO Lemont Refinery”
- **GC:** an abbreviation for “Gas Chromatograph”

RESPONSIBILITIES

Sponsor:

- Manager of Maintenance

Implementation:

- **Initiation:** The Lemont Refinery Analyzer Supervisor/Specialist is responsible for overall program coordination and central documentation management.
- **Performance:** The Lemont Refinery Analyzer Supervisor/Specialist will be responsible for monitoring performance.
- **Audit:** The Analyzer Supervisor and/or Specialist & Environmental Department is responsible for compliance audit(s).

REFERENCES

Regulatory:

- Title 40CFR Part 60 & 75 – Protection of the Environment Continuous Emission Monitoring System (CEMS) Operating and Maintenance
- OSHA 1910.119 Process Safety Management of Highly Hazardous Chemicals

Policies/Procedures:

- Manufacturer Equipment-specific Documentation
- CITGO Petroleum Corporation Lemont Refinery, Engineering and Construction Specifications
- CITGO Petroleum Corporation Lemont Refinery, O&M Environmental Plan
- IMS-ANALYZER –LIST
- MNT-A-0003 PREVENTATIVE MAINTENANCE: Process Analyzers

Attachments/Forms:

- n/a

PROCEDURE STEPS

2.0 Testing and Calibration:

2.1 OBTAIN necessary permissions and permits from Operations prior to removing GC from service.

2.2 VERIFY proper calibration standards (gases, optical filters, etc.) are connected to the GC.

2.3 If validation/calibration can be completed without disturbing the process, PROCEED in accordance with manufacturer's and CITGO's specifications and procedures.

WARNING

DO NOT touch hot surfaces with bare hands. (ex: lamps, photo-tubes, oven components). After lamps and/or photo-tubes cool, use a clean cloth and methanol to clean surfaces.

2.4 In the event of validation/calibration failure: REPEAT calibration sequence to correct problem. If failure continues, analyzer maintenance will be required.

2.5 REPEAT sequence after any maintenance of the analyzer is completed.

2.6 MONITOR and VERIFY proper operation of analyzer through designated reporting system (such as a local indication, DCS, PI, and/or DAHS), if changes or repairs were performed.

2.7 When completing a validation/calibration sequence of analyzer system connected to DAHS: VERIFY sequence has been initiated each day for the DAHS for the "Time of Day" Auto-validation.

END OF PROCEDURE

MNT-A-0003 PREVENTATIVE MAINTENANCE: Process Analyzer

PURPOSE

This procedure provides actions and guidelines for the preventative maintenance (testing, repair and calibration) of process analyzers.

SCOPE

Applies To:

This procedure is applicable to all analyzer equipment associated with the IMS program, per **IMS-ANALYZER-LIST**.

Note: The CITGO Refinery Analyzer Specialist maintains additional documentation listing the functional locations of process analyzers associated with this procedure.

Exceptions:

This procedure does not apply to portable analyzers or analyzers utilized in the CITGO Lemont Laboratory facility.

GENERAL

Research/Review the following:

- SDS (Safety Data Sheet)
- Lemont Refinery EMERGENCY ACTION and SAFETY MANUAL
- SPS (Safe Practice Standards)
- Equipment specification sheet
- Manufacturer's specifications
- Loop sheets
- Electrical drawings

DEFINITIONS/ABBREVIATIONS

- **Analyzer:** An instrument that performs analysis to determine, either qualitatively, quantitatively, or both, the component(s) in a mixture. The value(s) representative of the component(s) may be a measurement of purity, or impurity, based on customer needs.
- **Validation:** A test of the analyzer, using calibration standards, to determine if the difference between current readings and the standard are outside accepted tolerances.
- **Calibration:** Adjustments made to the analyzer until the difference between the current readings and the known calibration standard values are within acceptable tolerances. Sometimes this is a manual adjustment, and sometimes it is performed by the analyzer as a part of the sequence.
- **DAHS:** Refers to a data acquisition and handling system, used to collect. Manage and report CEMS data. The Lemont Refinery Data Acquisition System is a Vivicom VCEMS2000 data handling system. It uses an ADM (Analog to Digital Module) to link the analyzer(s) from the field to a central server for further processing, display, or archiving.

- **DCS (Distributive Control System)**: Class of instrumentation consisting of computers, programmable controllers, minicomputers, and microprocessor-based systems that have shared control, shared display or other interface features. The equipment is used for interfacing field instrumentation, control room instrumentation, and other hardware for process control. Terminology is defined in the broadest generic form to describe the various categories of these devices.
- **Inspection:** A check of instrument equipment to ensure that the equipment is functioning properly. This inspection is performed while the equipment is in service and may include visual observations and measurements.
- **CLR:** an abbreviation for "CITGO Lemont Refinery"
- **Preventive Maintenance (PM)**: Programs/processes of inspection and regular care that allows potential problems to be detected and solved early or prevented altogether. The checks may include visual, mechanical, electrical, and electronic actions that are made to determine whether or not equipment is functioning properly thereby resulting in steps to retain an item in the specified condition.

RESPONSIBILITIES

Sponsor:

- Manager of Maintenance

Implementation:

- **Initiation:** The Lemont Refinery Analyzer Supervisor/Specialist is responsible for overall program coordination and central documentation management.
- **Performance:** The Lemont Refinery Analyzer Supervisor/Specialist will be responsible for monitoring performance.
- **Audit:** The Analyzer Supervisor and/or Specialist & Environmental Department is responsible for compliance audit(s).

REFERENCES

Regulatory:

- Title 40CFR Part 60 & 75 – Protection of the Environment Continuous Emission Monitoring System (CEMS) Operating and Maintenance

Policies/Procedures:

- Manufacturer Equipment-specific Documentation
- CITGO Petroleum Corporation Lemont Refinery, Engineering and Construction Specifications
- CITGO Petroleum Corporation Lemont Refinery, O&M Environmental Plan
- IMS-ANALYZER –LIST

Attachments/Forms:

- n/a

PROCEDURE STEPS

3.0 Inspection and Maintenance:

3.1 INSPECT physical and operating condition of analyzer, for the following, if applicable:

- Correct gas cylinder pressures
- Proper sample and sample bypass flow rates
- Shelter hardware (doors, seals, lights, etc) for good condition
- HVAC equipment working properly
- Cleanliness of shelter and hardware

3.2 If repairs, cleaning, and/or corrections of deficiencies can be performed without disturbing the process: PROCEED in accordance with manufacturer's and CITGO's specifications and procedures.

WARNING

DO NOT touch hot surfaces with bare hands. (ex: lamps, photo-tubes, oven components)

3.3 CLEAN filters, mirrors and windows, as applicable.

3.4 MONITOR and VERIFY proper operation of analyzer through designated reporting system (such as a local indication, DCS, PI or DAHS), as applicable.

4.0 Testing and Calibration:

4.1 INSPECT analyzers.

4.2 OBTAIN proper solution, gas, test equipment, and/or materials to perform test as applicable.

4.3 PERFORM test and/or calibration in accordance with manufacturer's recommendations and/or CITGO's procedures, if applicable.

4.4 REINSTALL wires, tubing or piping removed for test and/or calibration, if applicable

4.5 MONITOR and VERIFY proper operation of analyzer through designated reporting system; ex: local indication, DCS, PI or DAHS, if calibration changes were performed.

5.0 Repairs:

5.1 DISCUSS scope of repairs and unit operational limits with Operations personnel.

5.2 OBTAIN required permits per CITGO Safety procedures.

5.3 CONTROL hazardous energy as required for facilitating repairs.

5.4 COMPLETE necessary repairs to equipment referencing OEM manuals, and using Craft knowledge.

5.5 PLACE analyzer in service

5.6 MONITOR and VERIFY proper operation of analyzer through designated reporting system (such as a local indication, DCS, PI, and/or DAHS), if changes or repairs were performed.

5.7 RETURN equipment to Operations control, as required.

5.8 CLEAR/END permits per CITGO safety procedures.

6.0 Spare Parts:

6.1 SAP should be the domicile for analyzer spare parts listings.

6.2 Spare parts should be stocked based on the results of past history and/or manufacturer recommendations.

7.0 Modifications of Inspection Frequency

7.1 Testing and inspection frequency are defined in a document separate from this procedure.

7.2 Testing and inspection frequency should be modified based on past history, manufacturer recommendations or good engineering practices.

8.0 Obsolescence Program

8.1 An Analyzer Replacement Program will be reviewed annually by Analyzer Coordinator or Specialist in conjunction with the yearly Capital Medium-term Plan (MTP). All environmental analyzer systems, based on source identification from the DAHS system and IMS-ANALYZER-LIST, will be added to this program when the analyzer is obsolete or critical spare parts cannot be obtained. Obsolete and spare parts for an environmental system are all based on manufacturer information. Replacement decisions are based on MTP guidelines. All evaluation of the environmental analyzer system and DAHS are based on the environmental O&M procedure.

END OF PROCEDURE